

# Solid State Relays 1-Phase with Heatsink and Integrated Fuse Type RGC1F



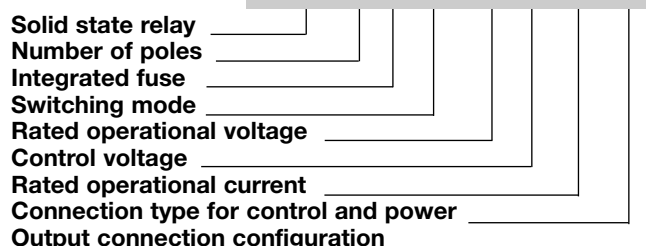
- 35mm product width
- Solid state contactor with integrated fuse
- AC zero cross switching
- Operational voltage: up to 600 VAC
- Rated load currents of 20 AAC, 30 AAC and 40 AAC
- Control voltage: 4.5 - 32 VDC
- Integrated voltage transient protection with varistor
- Detection of SSR and load malfunction (RGC1FS)
- Alarm output signal (RGC1FS)
- 100 kA short circuit current rating

## Product Description

This solid state contactor includes three functions in one housing: power switching, short circuit protection by semiconductor fuse and system monitoring. RGC1FA is the version including the power-switch and the fuse version with a fuse while the RGC1FS includes also the monitoring function which detects load, fuse and SSR faults.

The front panel can be opened for easy access of the fuse and the fuse holder accepts fuses from a wide range of manufacturers. Alarms (in RGC1FS) are indicated by a red LED on the front and a signal which is normally closed. Product width is 35mm for the whole range and covers up to 600VAC and 40AAC. Specifications stated at 25°C unless specified.

## Ordering Key **RGC 1 F A 60 D 30 GG E**



## Ordering Key

Type	Integrated fuse	Mode	Rated voltage	Control voltage	Rated current	Connection control/ power	Connection configuration
<b>RGC1</b>	F	A: Zero cross switching + fuse + fuse holder  S: Zero cross switching + fuse + fuse holder + system monitoring	23: 230VAC 60: 600VAC	D: 3 or 4.5 - 32VDC	20: 20AAC 30: 30AAC 40: 40AAC	G: Box Clamp	E: Contactor

### Warning

- Risk of electric shock
- Do not open fuse panel when the product is in operation
- Switch off the panel before doing any maintenance on the product. Panel should be closed before restarting operation.
- Failure to follow these instructions may result in serious injury (or worse) and/or equipment damage



## Selection Guide

Rated output voltage	Options	Control voltage	Rated operational current at 40°C		
			20 AAC	30 AAC	40 AAC
230VAC	Fuse Only	3 -32VDC	RGC1FA23D20GGE	RGC1FA23D30GGE	RGC1FA23D40GGE
600VAC	Fuse Only	4.5 -32VDC	RGC1FA60D20GGE	RGC1FA60D30GGE	RGC1FA60D40GGE
230VAC	Fuse +Sensing	3 - 32VDC	RGC1FS23D20GGE	RGC1FS23D30GGE	RGC1FS23D40GGE
600VAC	Fuse +Sensing	4.5 -32VDC	RGC1FS60D20GGE	RGC1FS60D30GGE	RGC1FS60D40GGE

## Output Voltage Specifications

	RGC1F..23	RGC1F..60
Operational Voltage Range (+10%, -15% on max)	24-240 VAC	42-600 VAC
Blocking Voltage	800 Vp	1200 Vp
Internal Varistor	275 V	625 V

## General Specifications

Latching voltage (across L1-T1)	20V
Operational frequency range	45 to 65Hz
Power factor	0.5 at rated voltage
Touch Protection	IP20
LEDs	Control ON: Green, full intensity Supply ON: Green, half intensity Fault: RED
	RG1CFS RG1CFS
Pollution degree	2 (non-conductive pollution with possibilities of condensation)
Over-voltage category	III (fixed installations)
Isolation	
Input to Output	4000Vrms
Input & Output to Case	4000Vrms

## Supply Specifications (A1+, A2- for RGC1FS)

Rated supply voltage, $U_s^1$	24 VDC -15%, +20% according to EN61131-2:2003
Max input current	80 mA during normal conditions 20 mA during alarm conditions

## Alarm Output Specifications (OUT for RGC1FS)

Type	PNP open Collector Normally closed
Rating (@ 40°C)	50mADC, 35VDC

## Output Specifications

	RGC1F..20	RGC1F..30	RGC1F..40
Rated operational current			
AC-51 rating @ $T_a=40^\circ\text{C}$ (IEC60947-4-3 / UL508) <sup>2</sup>	20 AAC	30 AAC	40 AAC
AC-53a rating @ $T_a=40^\circ\text{C}$ (IEC60947-4-3 / UL508)	4.7 AAC	6 AAC	8 AAC
Number of motor starts (x:6, Tx:6s, F:50%) at $40^\circ\text{C}$ <sup>2,3</sup>	30	30	30
Min. operational current	0.2 A	0.2 A	0.2 A
$I^2t$ of integrated fuse @ 690V (size: 14 x 51mm)	740 A <sup>2</sup> s	1400 A <sup>2</sup> s	3100 A <sup>2</sup> s
Critical dv/dt (@ $T_j$ init = $40^\circ\text{C}$ )	1000 V/us	1000 V/us	1000 V/us

## Motor Ratings: HP (UL508) / kW (EN/IEC60947-4-2) @ 40°C

	115 VAC	230 VAC	400 VAC	480 VAC	600 VAC
RGC1F..20	1/6HP / 0.18kW	1/3HP / 0.37kW	3/4HP / 0.75kW	1HP / 1.1kW	1-1/2HP / 1.1kW
RGC1F..30	1/4HP / 0.25kW	1/2HP / 0.56kW	1HP / 1.1kW	2HP / 1.5kW	2HP / 1.5kW
RGC1F..40	0.37kW	0.75kW	1.5kW	1.5kW	2.2kW

1: DC voltage to be supplied by a Class 2 power source

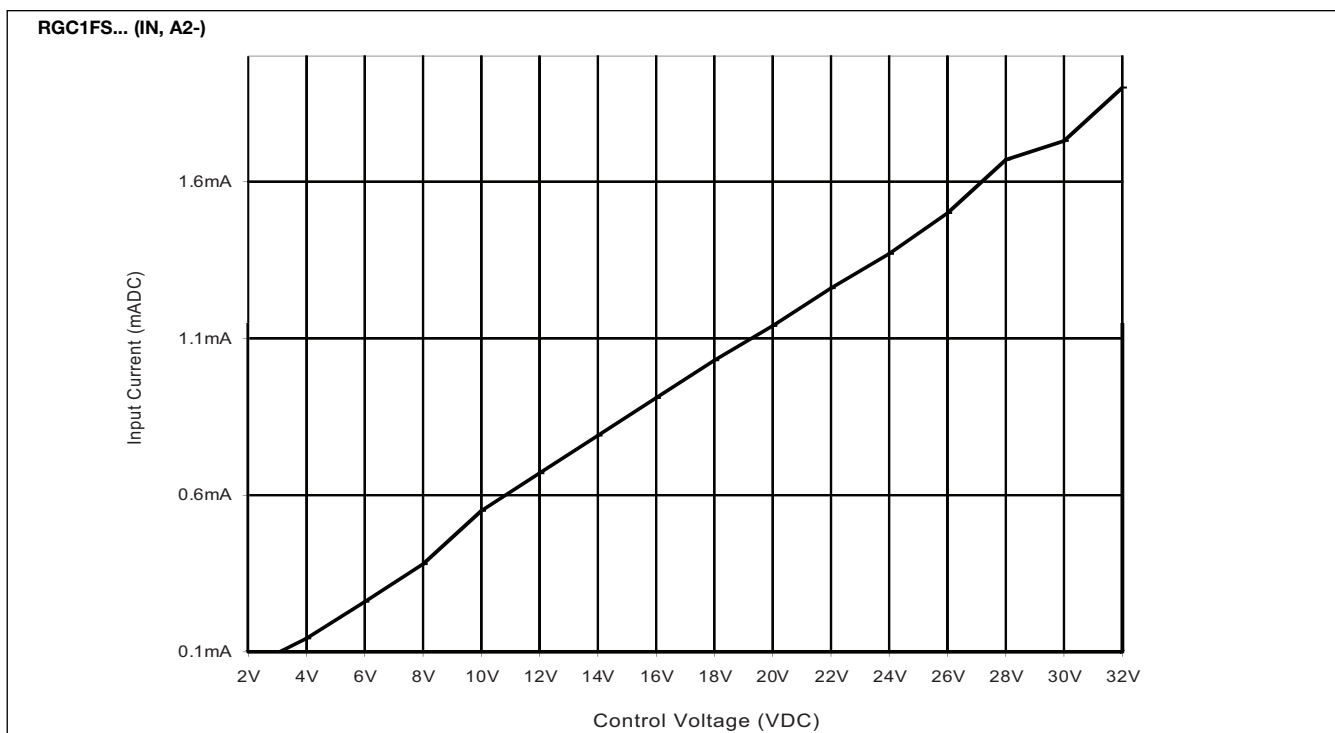
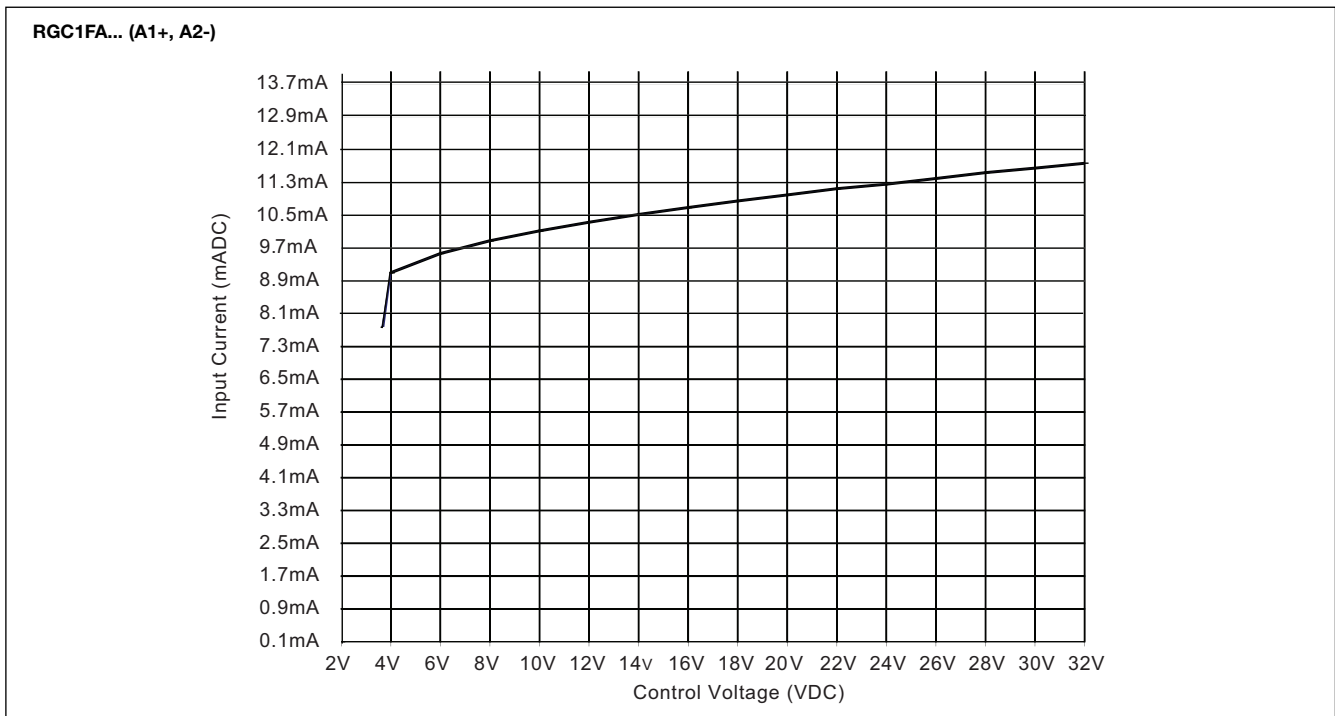
2: Refer to Derating curves

3: x: multiple of AC-53a current rating, Tx: duration of current surge, F: duty cycle

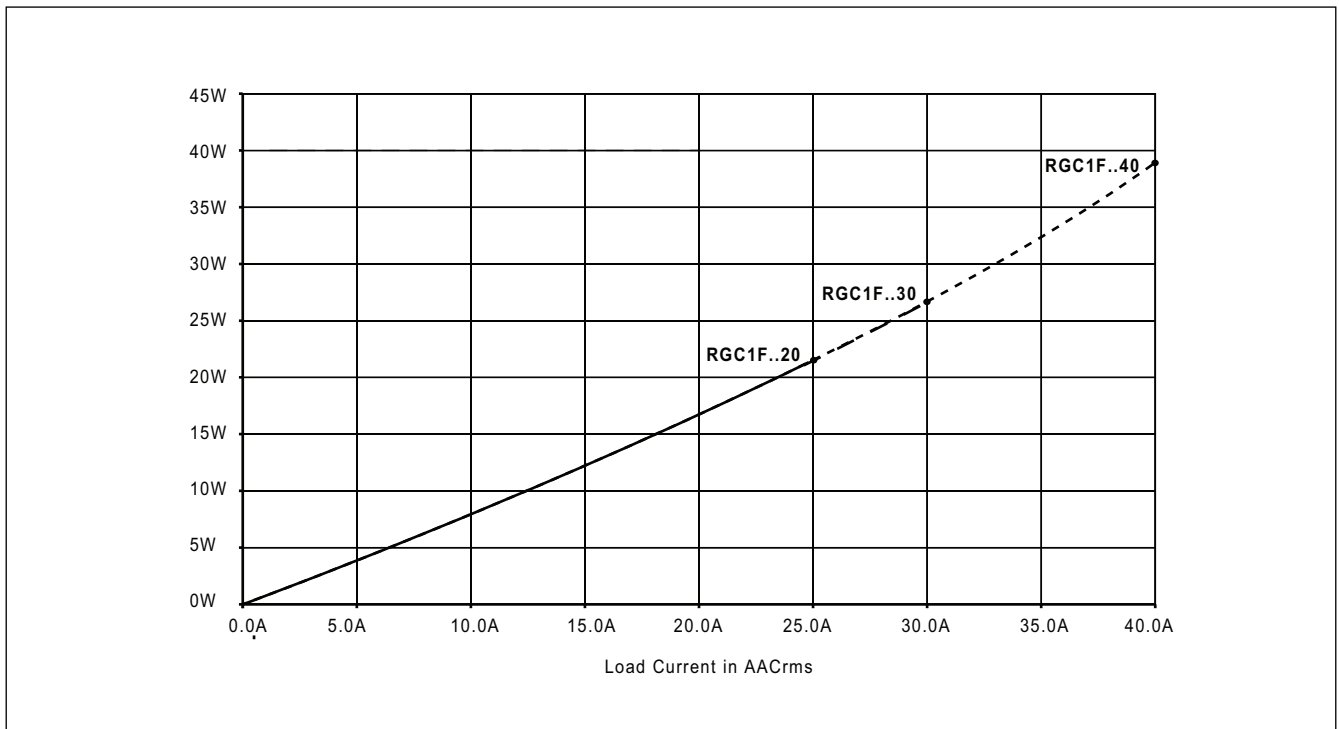
## Control Input Specifications

Control voltage range, $U_{c1}$	
<b>RGC1FA</b>	
A1+, A2 for RGC1FA23..	3 - 32VDC
A1+, A2 for RGC1FA60..	4.5 - 32VDC
<b>RGC1FS</b>	
IN, A2 for RGC1FS23..	3 - 32VDC
IN, A2 for RGC1FS60..	4.5 - 32VDC
Pick-up voltage	
RGC1F..23	3 VDC
RGC1F..60	4 VDC

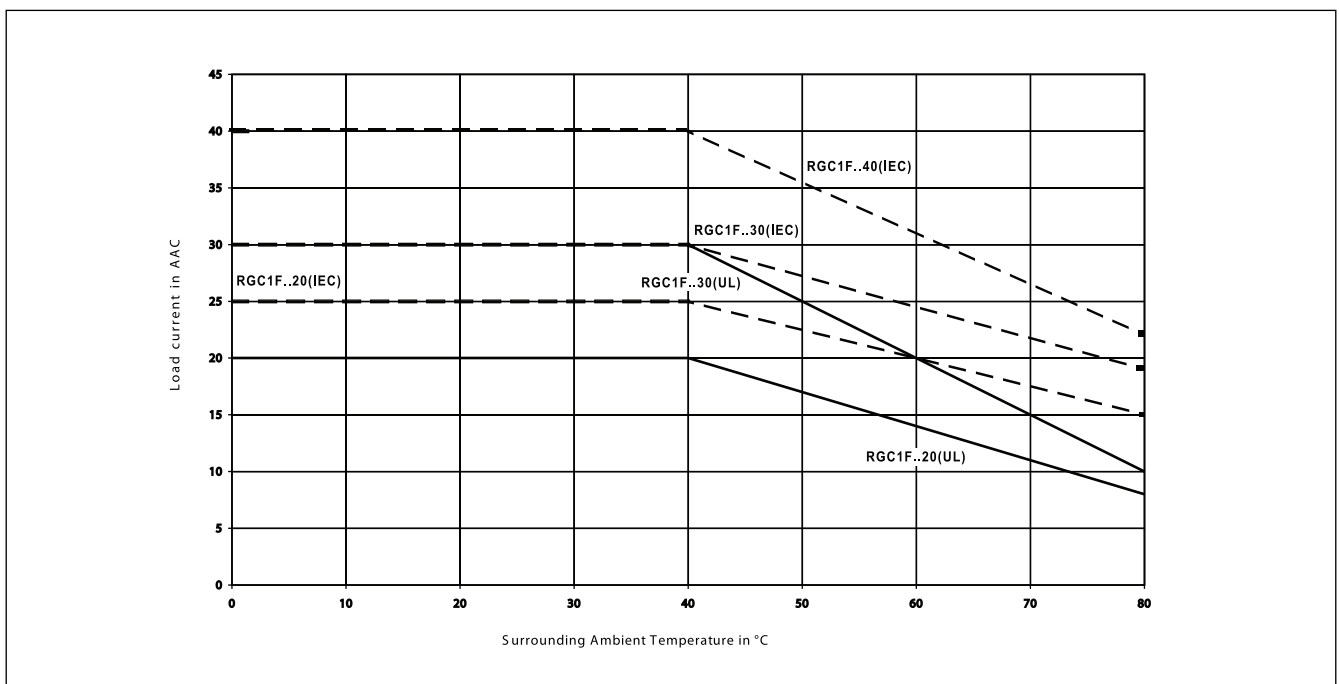
Drop-out voltage	1.0 VDC
Response time pick-up	0.5 cycle
Response time drop-out	0.5 cycle
Max reverse voltage	32 VDC
Input current	See diagram below



## Output Power Dissipation

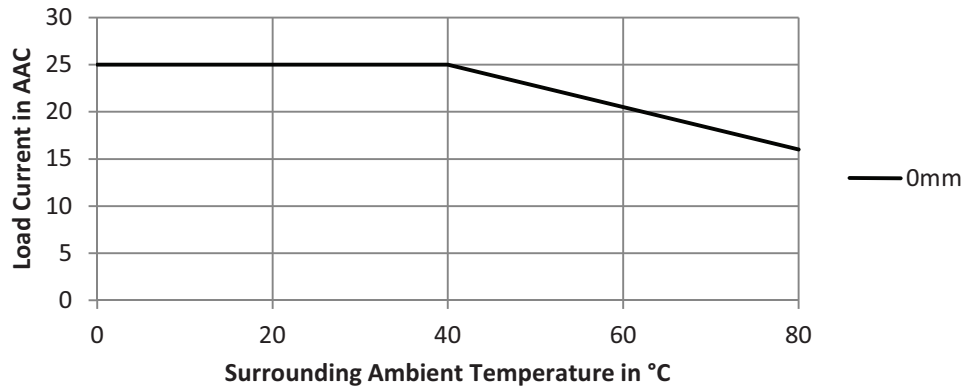


## Current Derating (UL 508/ EN/IEC 60947-4-2/-3)

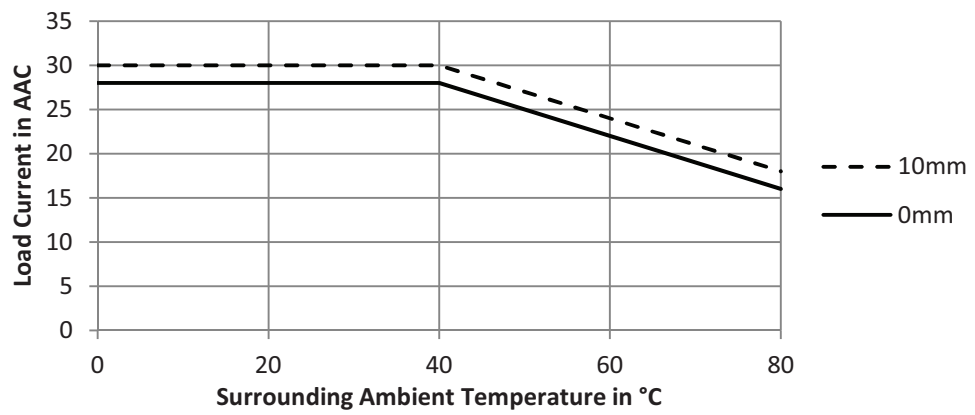


## Derating vs. Spacing Curves

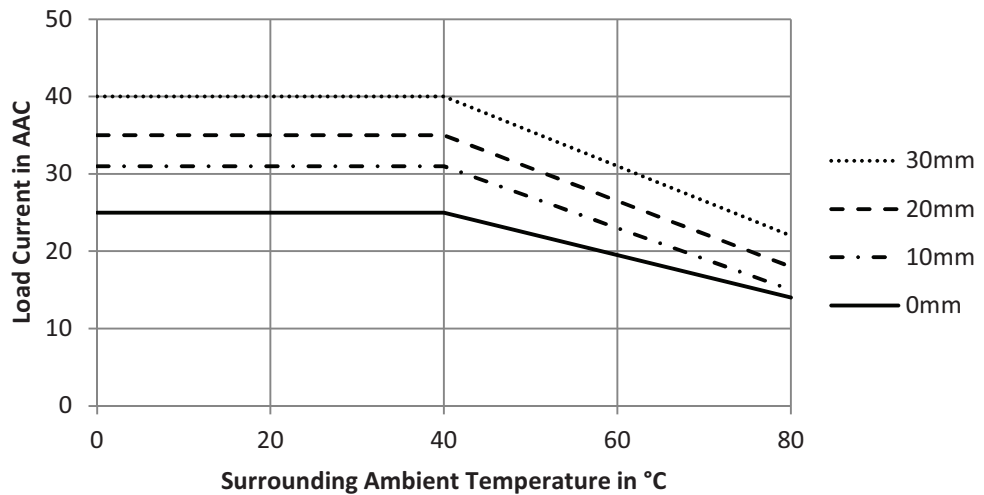
RGC1F..20



RGC1F..30



RGC1F..40



## Agency Approvals and Conformances

Conformance	IEC/EN 62314	Agency Approvals	cULus listed (UL 508), E172877
	IEC/EN 60947-4-2		
	IEC/EN 60947-4-3	Short circuit current rating	100kA (UL508)



## Electromagnetic Compatibility

<b>EMC Immunity</b>	IEC/EN 61000-6-2	<b>Radiated Radio Frequency Immunity</b>	IEC/EN 61000-4-3
<b>Electrostatic Discharge (ESD) Immunity</b>	IEC/EN 61000-4-2	10V/m, 80 - 1000 MHz	Performance Criteria 1
Air discharge, 8kV	Performance Criteria 2	10V/m, 1.4 - 2.0GHz	Performance Criteria 1
Contact, 4kV	Performance Criteria 2	3V/m, 2.0 - 2.7GHz	Performance Criteria 1
<b>Electrical Fast Transient (Burst) Immunity</b>	IEC/EN 61000-4-4	<b>Conducted Radio Frequency Immunity</b>	IEC/EN 61000-4-6
Output: 4kV, 5kHz	Performance Criteria 2	10V/m, 0.15 - 80 MHz	Performance criteria 1
Input: 1kV, 5kHz	Performance Criteria 2	<b>Voltage Dips Immunity</b>	IEC/EN 61000-4-11
<b>Electrical Surge Immunity</b>	IEC/EN 61000-4-5	0% for 0.5/ 1 cycle,	Performance Criteria 2
Output, line to line, 1kV	Performance Criteria 1	70% for 25 cycles	Performance Criteria 2
Output, line to earth, 2kV	Performance Criteria 1	40% for 10 cycles	Performance Criteria 2
Signal, line to line, 1kV	Performance Criteria 2	<b>Voltage Interruptions Immunity</b>	IEC/EN 61000-4-11
Signal, line to earth, 2kV	Performance Criteria 2	0% for 5000ms	Performance Criteria 2
<b>EMC Emission</b>	<b>IEC/EN 61000-6-4</b>	<b>Radio Interference Field Emission (Radiated)</b>	IEC/EN 55011
<b>Radio Interference Voltage Emission (Conducted)</b>	IEC/EN 55011	<b>30 - 1000MHz</b>	Class B (light industry)
<b>0.15 - 30MHz</b>	Class A (industrial)		

### Note:

- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference.
- Use of AC solid state relays may, according to the application and the load current, cause conducted radio interferences. Use of mains filters may be necessary for cases where the user must meet E.M.C requirements. The capacitor values given inside the filtering specification tables should be taken only as indications, the filter attenuation will depend on the final application.
- Performance Criteria 1: No degradation of performance or loss of function is allowed when the product is operated as intended.
- Performance Criteria 2: During the test, degradation of performance or partial loss of function is allowed. However when the test is complete the product should return operating as intended by itself.
- Performance Criteria 3: Temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.

## Environmental Specifications

Operating Temperature	-30°C to 80°C (-22°F to 176°F)	Vibration resistance (2-100Hz, EN50155, EN61373)	2g per axis
Storage Temperature	-40°C to 100°C (-40°F to 212°F)	Relative humidity	95% non-condensing @ 40°C
RoHS (2002/95/EC)	Compliant	UL flammability rating (housing)	UL 94 V0
Impact resistance (EN50155, EN61373)	15/11 g/ms		

# Connection Specifications

## POWER CONNECTIONS:

Use 75°C copper (Cu) conductors

**2/T1**      **1/L1**



**Stripping Length (X)**  
**Torque specifications**

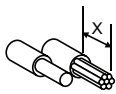
11mm      8mm  
UL: 2.5Nm (22 lb-in)



**Rigid (Solid & Stranded)**  
UL/CSA rated data



M5, Pozidriv2 IEC: 2.5 - 3.0Nm (22 - 26.6lb-in)	M4, Pozidriv2 IEC: 2.0 - 2.5Nm (17.7 - 22lb-in)
1 x 2.5..25mm <sup>2</sup>	1 x 2.5..10mm <sup>2</sup>
1 x 14..3 AWG	1 x 14..8 AWG



**Flexible with end sleeve**



1 x 14..10 AWG	1 x 14..10 AWG
1 x 2.5..16mm <sup>2</sup>	1 x 2.5..6mm <sup>2</sup>
1 x 14..6 AWG	1 x 14..10AWG



**Flexible without end sleeve**

1 x 4..25mm <sup>2</sup>	1 x 4..10mm <sup>2</sup>
1 x 12..3 AWG	1 x 12..8AWG



## CONTROL & AUXILIARY CONNECTIONS: A1(+), A2(-), IN, OUT

Use 60/75°C copper (Cu) conductors

**Stripping Length (X)**      6mm

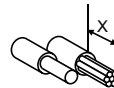
**Torque specifications**

UL: 0.5Nm (4.4lb-in)  
IEC: 0.4- 0.5Nm (3.5 - 4.4lb-in)



**Rigid (Solid & Stranded)**  
UL/CSA rated data

1 x 0.5..2.5mm<sup>2</sup>  
1 x 18..12 AWG



**Flexible without end sleeve**

1 x 0.5..2.5mm<sup>2</sup>  
1 x 18..12AWG



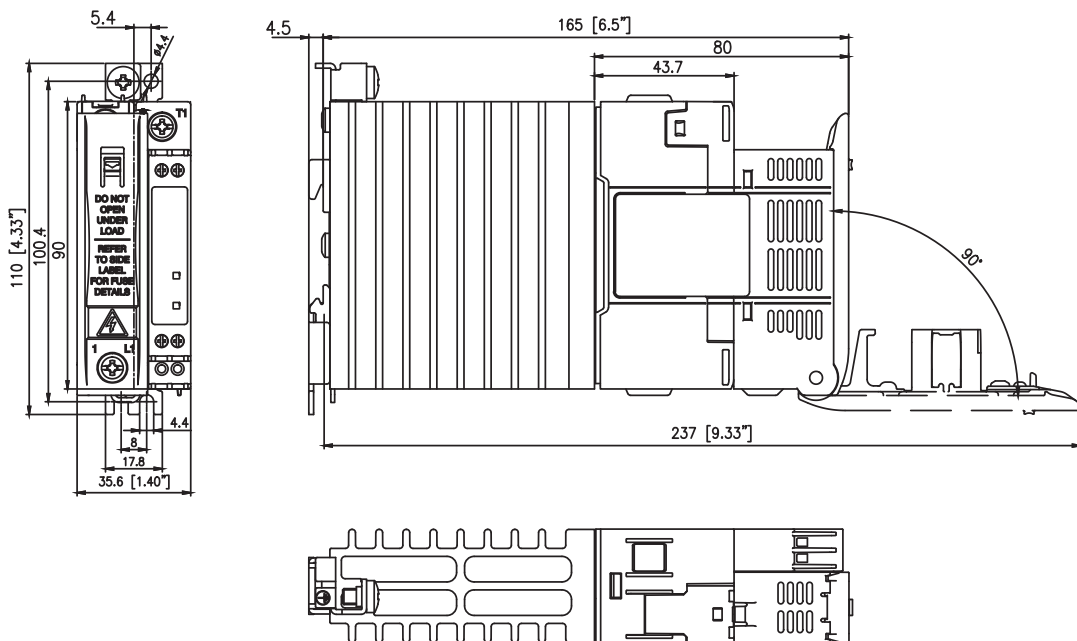
**Protective Earth Connection**

M5, 1.5Nm (13.3 in-lb)



Note: M5 PE screw not provided with SSR. PE connection required when product is intended to be used in Class 1 applications according to EN/IEC 61140.

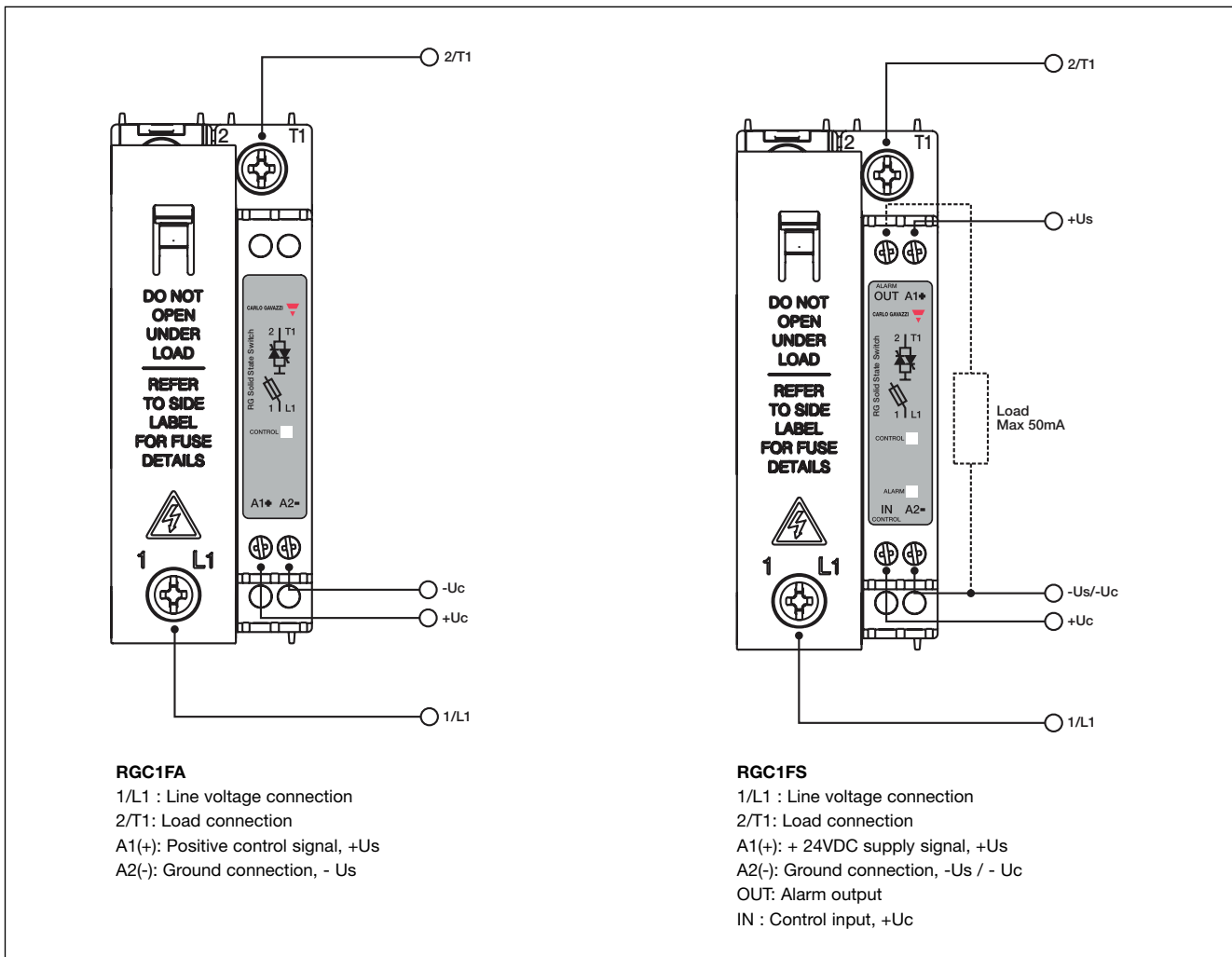
## Dimensions



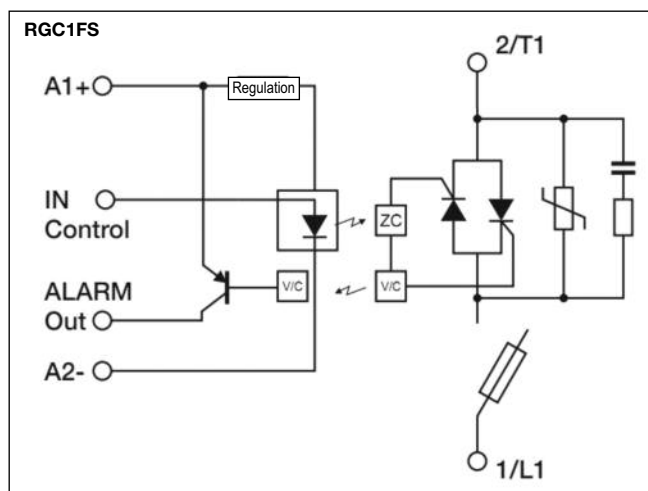
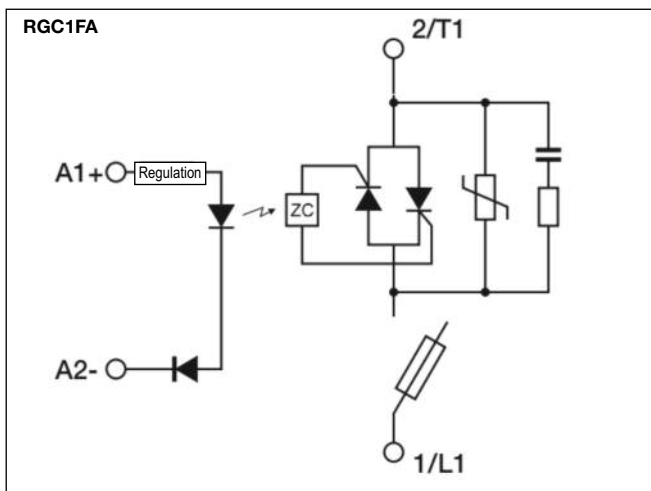
Note: fuse is included in product

\* Housing width tolerance +0.5mm, -0mm...as per DIN43880  
All other tolerances: ± 0.5mm  
All dimensions in mm

## Terminal Markings and Connection Diagrams



## Schematic Diagrams







## Function Diagram: RGC1FS

Indication LED	Control OFF	Control ON	Line Voltage Loss	Line Voltage Loss	Heater Break	Power Supply Loss	Power Supply Loss	SSR open circuit	SSR short circuit	SSR short circuit	Open Fuse
Line voltage (1 L1)	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Load current (2 T1)	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Control voltage, Uc (IN)	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Control/ Supply LED (Green)	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Power Supply, Us (A1, A2)	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Fault LED (Red)	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Alarm signal (Normally closed) (OUT)	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
	Normal operation. SSR off	Normal operation. SSR on	Line voltage loss detected without control voltage, i.e. when SSR output is switched off	Line voltage loss detected with control voltage applied, i.e. when SSR output is switched on	Heater break is detected when the control is applied.	All function stops due to loss of power supply.	All function stops due to loss of power supply, even when a control voltage is applied.	If SSR output does not switch ON when control voltage is applied an alarm condition results.	Shorted output is detected even when the control voltage is applied.	Shorted output is detected when the control is not applied. Output would be conducting when it should be in the OFF- state	If fuse blows alarm signal is emitted from OUT terminal and the OPEN FUSE LED will also light up.

Note:

- Half light intensity Green LED to indicate application of power supply. Full brightness to indicate presence of control input.
- Faults indicated by a continuous lighting RED LED.
- Auto-reset function. The alarm signal turns OFF and SSR proceeds normal operation when alarm condition is no longer present.

### Co-ordination type 1 (UL508)

Part No.	Max. fuse size [A]	Class	Current [kA]	Voltage [VAC]
RGC1F.20	30	J or CC	100	Max. 600 VAC
RGC1F.30	30	J or CC	100	Max. 600 VAC

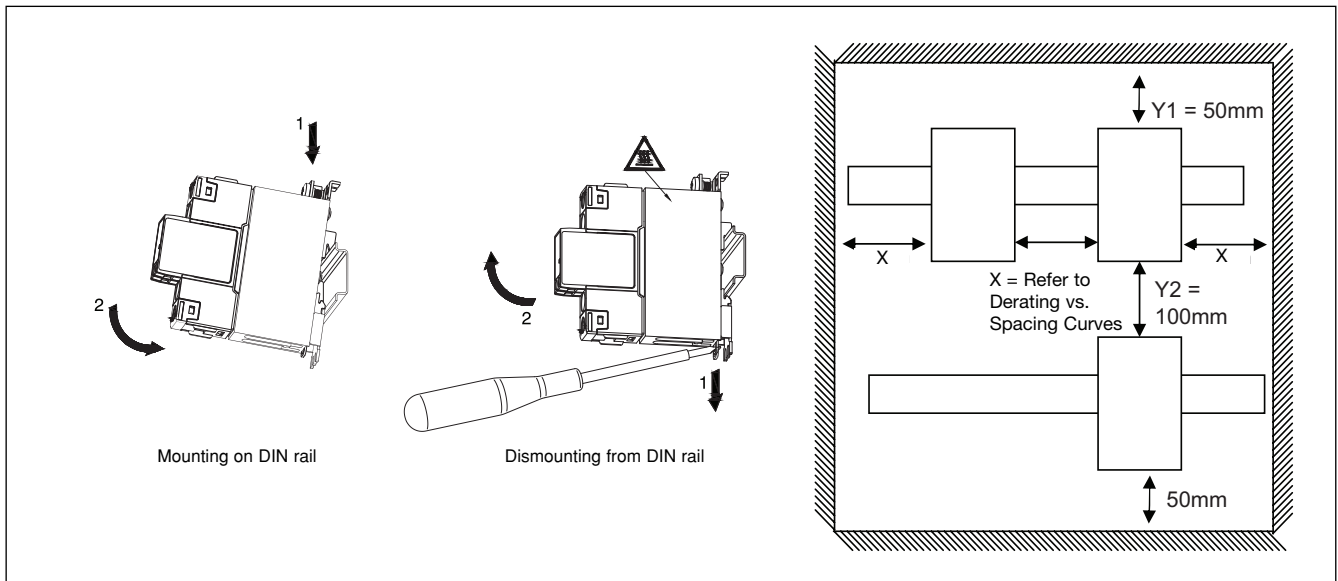
For UL applications an external Class J fuse shall be installed. Tests with Class J fuses are representative of Class CC fuses.

Suitable for use on a circuit capable of delivering not more than 100,000 Arms symmetrical Amperes, 600 volts maximum when protected by fuses. Tests at 100,000 A were performed with class J fuses, fast acting: please refer to the table above for maximum allowed ampere rating of the fuse. Use fuses only.

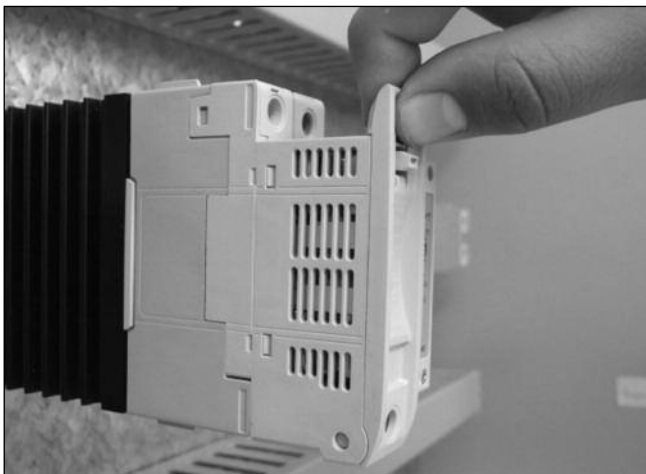
### Co-ordination type 2 - Semiconductor fuses (integrated)

Part No.	Max. fuse size [A]	Type (Siba)	Type (Cooper Bussman)	Current [kA]	Voltage [VAC]
RGC1F.20	25	50 124 34. 25	FWP-25A14F	100	Max. 600
RGC1F.30	30	50 124 34. 30	FWP-30A14F	100	Max. 600
RGC1F.40	40	50 124 34. 40	FWP-40A14F	100	Max. 600

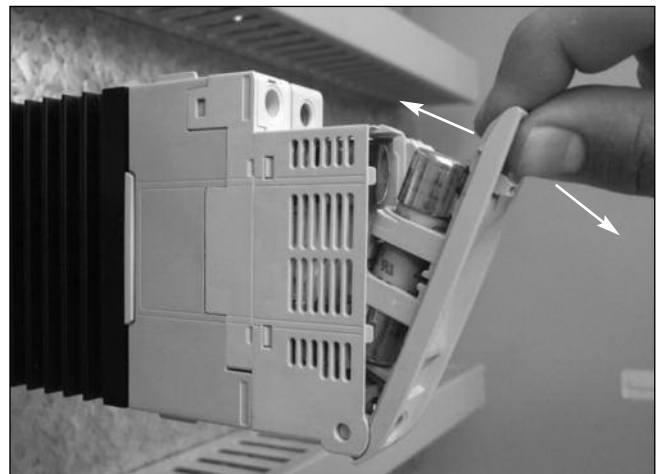
## Installation Instructions



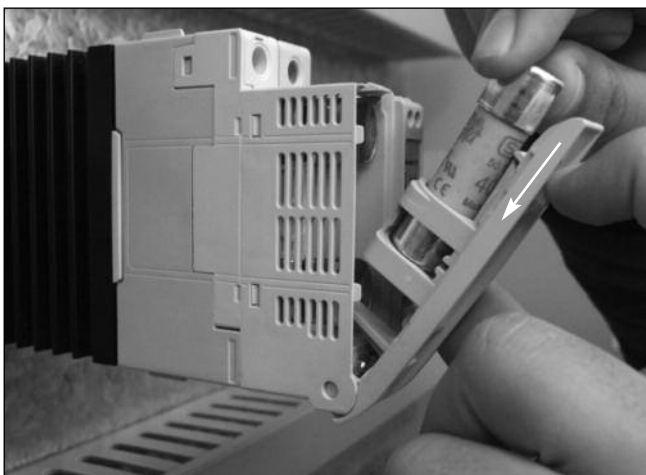
## Fuse Changing Instructions



1. Preparation for opening fuse holder.



2. Opening or closing the fuse holder.



3. Removal or Insertion of fuse.



4. Pressing downwards the fuse-holding clip to insert or remove the fuse